

5207

~~CONFIDENTIAL~~  
Pursuant to DOC Systematic Review  
Guidelines as described in Section  
3.3(a), Executive Order 12356.

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3.3(a), Executive Order 12356.

Department of Commerce and Labor

COAST AND GEODETIC SURVEY

R. S. Patton

Superintendent.

State: Territory of Hawaii

DESCRIPTIVE REPORT.

Hydrographic 5207  
Sheet No. 42

LOCALITY:

Raita Bank, Hawaiian Islands

U. S. COAST & GEODETIC SURVEY  
LIBRARY AND ARCHIVES  
OCT 10 1962  
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1960

CHIEF OF PARTY:

O. W. Swainson

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Guidelines as described in Section  
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3.3(a), EXECUTIVE ORDER 12356

DEPARTMENT OF COMMERCE  
U. S. COAST AND GEODETIC SURVEY

HYDROGRAPHIC TITLE SHEET

**CONFIDENTIAL**

REG. NO. 5207

The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.

Field No. 42 - Proj. 55

REGISTER NO. 5207

State ~~Territory of Hawaiian Is.~~

General locality N.W. of Gardner Pinnacles  
~~West of French Frigate Shoals~~

Locality Raita Bank

Scale 1:40,000 Date of survey June - July, 19 30

Vessel PIONEER

Chief of Party O. W. Swainson

Surveyed by O. W. Swainson

Protracted by V. M. Gibbens, Lt. (j.g.)

Soundings penciled by C. J. Wagner, Lt. (j.g.)

Soundings in fathoms feet

Plane of reference M.L.L.W.

Subdivision of wire dragged areas by

Inked by Harold W. Murray

Verified by H.W.M.

Instructions dated February 10, 19 30

Remarks:

U. S. GOVERNMENT PRINTING OFFICE

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3.3(a), EXECUTIVE ORDER 12356

DESCRIPTIVE REPORT  
TO ACCOMPANY HYDROGRAPHIC

SHEET NO. 42

Raita Bank, T. H.

Ship PIONEER, 1930.

DATE OF INSTRUCTIONS - Instructions for this sheet are included in those for project No. 55, dated February 10, 1930.

CONTROL - Raita Bank is an offshore bank too far from land to be controlled by visual fixes on shore signals. A series of seven signal buoys were placed from two to four miles apart along the long axis of the shoal. These buoys were of the two barrel type devised by the GUIDE in 1929 and improved by the PIONEER in 1930.

The southernmost buoy, called ABE was located by six sets of star observations made by three officers. The other buoys were tied to this or each other by R.A.R. distances and sun azimuths. A velocity of ~~1510~~ meters was used as the sound velocity. 1521

The northernmost buoy, called GOF, was also located by star observations. It checked the position as carried from ABE by 0.27 mile in longitude, and exactly in latitude.

SURVEY METHODS - The work was done on a scale of 1:40,000. The lines were spaced one-quarter mile except where closer lines were needed for development. Several lines were run out to the 500 and 1000 fathom curve but these curves are better developed on sheet 252.

The soundings were taken with the fathometer and checked by hand lead in the shoalest area. The hand lead gave approximately one fathom deeper water, but this was because the fathometer determined the depth over the top of the coral heads, while the hand lead did not. Where the sounding record indicates that a hand lead and fathometer sounding were taken simultaneously it does not mean the two soundings were at the same spot. The hand lead was taken at the bridge and the echo sounding 100 feet aft. In uneven coral bottom this distance makes considerable difference in the depth.

A list of thirteen comparisons of the fathometer with vertical casts is attached.

FATHOMETER CORRECTIONS - A detailed description of the method of determining the fathometer corrections is contained in the Season's Report of the PIONEER for 1930, project 55.

TIDES

Honolulu tide gauge was used for the <sup>tidal</sup> reduction of tides. The soundings

SHOALS, ETC. - In the shoaler areas the bottom was clearly visible. While sounding over the bank a lookout was maintained in the crow's nest or on the searchlight platform. When the shoaler areas were reached, the speed of the vessel was reduced and especial watchfulness maintained on the bridge and by the lookout for dangers. It is quite certain that had there been any spots with appreciably less depth than obtained by the fathometer, they would have been seen. No breakers were observed during a period of quite heavy swells.

FISH - Large schools of ulua were seen. Sharks were numerous.

STATISTICS -

Number of positions	- 1808
Number of soundings	- 12,330
Number of statute miles of sounding lines	- 1139
Number of comparisons of fathometer with vertical casts	- 15 <sup>16</sup>

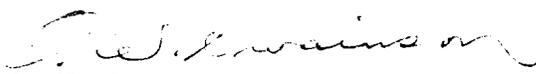
*Wes. Swanson, H.S. Eng.*  
*Chief of Party*

COMPARISON OF FATHOMETER WITH VERTICAL CASTS

Date	Vert. Cast	Large oscillator						Small oscillator					
		No. 1	Theor. Corr.	No. 2	Theor. Corr.	No. 3	Theor. Corr.	No. 1	Theor. Corr.	No. 2	Theor. Corr.	No. 3	Theor. Corr.
June 29	53.2							51	+ 2.6	51	+ 1.2	51	+ 1.2
29	79.1	77	+ 2.5	77.5	+ 2.5	75	+ 4						
29	19.6	19.5	+ 0.4	19.5	+ 0.4	18.5	+ 1.2	17.5	+ 1.9	17.0	+ 1.9	18	+ 1.8
30	16.5	15	+ 0.5	15	+ 0.5	15	+ 1.0			15.5	+ 2	15	+ 1.5
July 1	19.5			18.5	+ 0.5	18	+ 1.5						
2	21.3			20	+ 0.5	19.5	+ 1.5			19	+ 2	19.5	+ 2
3	19.5			18.5	+ 0.5	18	+ 1.5			17.5	+ 2	18	+ 2
4	18	15	+ 0.5	17	+ 0.5	16	+ 1	15.5	+ 2	15	+ 2	14.5	+ 1.5
5	18.5									15.5	+ 2	15.0	+ 2
5	20.5									18	+ 2	20	+ 2
5	19.1									18	+ 2		
5	17.8			17.8	+ 0.5	17.3	+ 1.5			16	+ 2	16.1	+ 1.5
5	17.2			16.5	+ 0.5	17.2	+ 1.0						
7	21.2			20.5	+ 0.5	19.5	+ 1.5			19.5	+ 2		
8	20.8			18.5	+ 0.5	20	+ 1.5			19	+ 2	18.5	+ 2
8	21			20.5	+ 1	19.5	+ 1.5			19	+ 2	18.5	+ 2

REPORT OF COMMANDING OFFICER'S INSPECTION OF RECORDS.

The sounding records were carefully inspected. The smooth sheet was examined for discrepancies in the soundings. The positions or the soundings were not checked on the smooth sheet except by inspection and comparing with boat sheet. ✓

  
O. W. Swainson,  
H. & G. Engineer,  
Commanding PIONEER.

Mar. 21, 1933

Section of Field Records

Report on H-5207 (Conf.)

N. W. of Gardner Pinnacles, Raita Bank, Haw. Ids.

Chief of Party - O. W. Swainson

Surveyed by - O. W. S.

Retracted by V. M. Gibbens

Soundings plotted by C. G. Wagner

Verified & inked by Harold W. Murray

1. The records conform to the requirements of the Hydrographic Manual.
2. The plan, character and extent of development satisfy the specific and general instructions except that not over a dozen bottom characteristics were taken.
3. The agreement of soundings is excellent. In the coral development on the South East, fathometer jumps of 3 & 4 fms. are quite common.
4. The 10 fm. curve was used solely for outlining individual shoals in the South East area.  
The 20 & 50 fm. curves can be satisfactorily <sup>drawn</sup> and unless the entire area save for a single exception.  
The 100, 200 and 1000 fm. curves were drawn where soundings permitted.
5. The Field plotting & plotting were of excellent quality.

6. Through some mishap in the field, the southern portion of this sheet became wet. A penciled note to the effect - "Verify projection and Lat. and Long. of O Abe" was found on the sheet. Since this note applied to the area affected by the dampness, O Abe was checked and found satisfactory with respect to the given projection.

An investigation was made of the projection in the affected area and the distortion noted.

The intersections along lat.  $25^{\circ}26'$  are satisfactory and unaffected.

along lat.  $25^{\circ}24'$ , the intersections of long.  $168^{\circ}34'$  &  $36'$  possess from 10 to 15 m. of distortion.

In lat.  $25^{\circ}22'$ , the present intersection at long.  $168^{\circ}36'$  is about 28 m. north and 10 m. east of the true intersection. Likewise the intersection at long.  $168^{\circ}34'$  is about 40 m. north and 20 m. east of the true intersection.

Distortion is also present in lat.  $25^{\circ}20'$  at intersection of long.  $169^{\circ}32'$  &  $34'$  but these points or areas enclose few if any soundings.

This distortion will have little if any effect upon the forthcoming chart but may have some bearing on the adjustment of other current surveys in areas where the slope of the bottom is quite rapid.

7. Several sounding lines possessing apparent discrepancies

Scale of sheet 1-40 000  
Distortion less than the probable error of location of soundings. etc.

were observed as follows:-

Pos. 104-106 B	1 or more fms. too low	Lat. $25^{\circ}22.7$	Long. $169^{\circ}35.7$
" 114-117 B	" " " " "	23.4	37.7
" 122-124 B	" " " " "	22.1	35.9
" 150-156 D	" " " " "	22.55	35.9
" 12-15 H	Course extension in 20 fms. Curve	30.0	31.5
" 130-131 H	" " " " "	32.0	32.0

All lines mentioned above were verified and inked.

In lat.  $25^{\circ}26.4$ , long.  $169^{\circ}38.4$ , the remaining soundings from pos. 15c to end of line were not plotted. They are somewhat indeterminate in position and disclose nothing additional save such bottom as can be readily interpolated.

The 10 fms. sounding of line 145-146 H day in lat.  $25^{\circ}29.5$ , long.  $169^{\circ}27.1$  was not confirmed by the crossing line of Pos. 13K (See P<sup>#</sup> 3 above).

8. Discrepancies in Dead Reckoning. At pos. 72N, lat.  $25^{\circ}39.5$ , long.  $169^{\circ}24.4$ , the field plotting of this line disclosed a displacement of 5 or more fms. in the crossing. The entire line, pos. 71-83N, was replotted, the error of course (2360 m.) redetermined and the line adjusted anew. It was then found that pos. 72N had not been adjusted. Adjustment of this position resulted in an excellent crossing.

At pos. 175D, lat.  $25^{\circ}22.2$ , long.  $169^{\circ}36.1$ , the vertical angle entry in the record of  $0^{\circ}1'31''$  was thought to be  $1^{\circ}31'00''$  since by trigonometry, the offset distance from O to be in-

creases as the angle decreases. This gives a corrected distance of about 356 m. using  $1^{\circ}31'$  as against 21,430 m. (approx.) The apparent discrepancy in plotting is believed to be one of adjustment rather than error.

9. There are no previous surveys in this area nor adjoining contemporary sheets save H-5213 (1:250,000) which embodies the entire area surrounding this survey. This sheet at present is in process of adjustment in the office.
10. No further surveying is required in this area.

11. Respectfully submitted — Harold W. Murray

March 24, 1933

12. Soundings from H-5213 have been adjusted and transferred to this survey. Agreement is satisfactory. Soundings transferred in blue are fathometer track soundings from H-46506 re-plotted on H-5213.

H.W.M.

SECTION OF FIELD RECORDS

Review of Hydrographic Sheet No. 5207 ~~Confidential~~  
Raita Bank, Northwest of Gardner Pinnacles, Hawaiian Islands  
Surveyed June - July 1930.  
Instructions dated Feb. 10, 1930. (Pioneer)

Chief of Party - O. W. Swainson.  
Surveyed by - O. W. Swainson.  
Protracted by - V. M. Gibbens.  
Soundings plotted by - C. J. Wagner.  
Verified and inked by - Harold W. Murray.

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Fathometer soundings.

1. The records generally conform to the requirements of the Hydrographic Manual. Very few bottom characteristics are recorded; none were recorded on the 16 fathometer comparisons on the sheet.
2. The plan and extent of development satisfy the specific instructions except for the lack of bottom characteristics.
3. Soundings are generally consistent, the agreement at line crossings being as close as can be expected in coral bottom of this nature.
4. Depth curves can be drawn satisfactorily. ~~The broken yellow curve is used to supplement the 10 fathom curve for indicating the high points of the shallowest area on the bank.~~
5. Junction is made with H. 5213 on all sides. The lines of the latter sheet were adjusted to the curves on H. 5207. The soundings in blue are from the records of H. 4650b as plotted on H. 5213.
6. Comparison. The representation of Raita Bank on chart 4000 is in good agreement with this survey. There was no previous Coast Survey work in this area.
7. The field drafting was excellent.

This survey (H. 5207) is considered very good and no further surveying in this area is deemed necessary.

8. Reviewed by R. J. Christman, April 1, 1933.

Inspected by E. P. Ellis.

Approved: *L. O. Colbert*  
Chief, Field Records Section.

*H. B. Bowen*

*W. H. Stewart*  
*Stude, Chief, H+ J.*

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ABSTRACT OF AZIMUTHS AND DISTANCES ON RAITA BANK

				Velocity 1519 m/sec
(1)	Abe - Cat	209 - 35	(Sun azimuth)	11,133 m. (R.A.R.)
(2)	Cat - Boy	28 - 28	" "	6,641 m. "
(3)	Cat - Egg	219 - 10 - 30	(Sun azimuth)	13,693 m. "
(4)	Egg - Dog	38 - 22	" "	7,438 m. "
(5)	Egg - Fin	214 - 38	" "	6,080 m. "
(6)	Egg - Got	214 - 49	" "	11,593 m. "

# GEOGRAPHIC POSITIONS

Accession No. of Computation: .....

Locality Raita Bank, T.H.

Datum Determined by Star Fixes

State T.H.

STATION	LATITUDE AND LONGITUDE	SECONDS IN METERS	AZIMUTH	BACK AZIMUTH	TO STATION	DISTANCE		
						LOGARITHM (METERS)	METERS	FEET
Aba	25 22 24 169 36 20	(1157.76) 738.50 (117.25) 559.15						
Bay	25 24 28.9 169 37 56.6	(856.98) 889.28 (9502) 1281.91						
cat	25 27 38.6 169 33 03.3	(658.50) 1187.74 (584.05) 92.20						
log	25 30 14.0 169 30 38.7	(7415.47) 430.29 (594.91) 1080.77						
Egg	25 33 23.5 169 27 53.4	(1123.15) 723.12 (184.24) 1490.60						
Fin	25 36 06.1 169 25 49.6	(1638.55) 187.21 (240.20) 1354.08						
Got	25 38 24.2 169 23 56.1	(793.00) 1052.36 (80875) 1564.96						

Comp - PWD  
- J.C.E.

E.O.M.  
June 30th 1930

At anchor on Raita  
Bank easting buoy Abe.

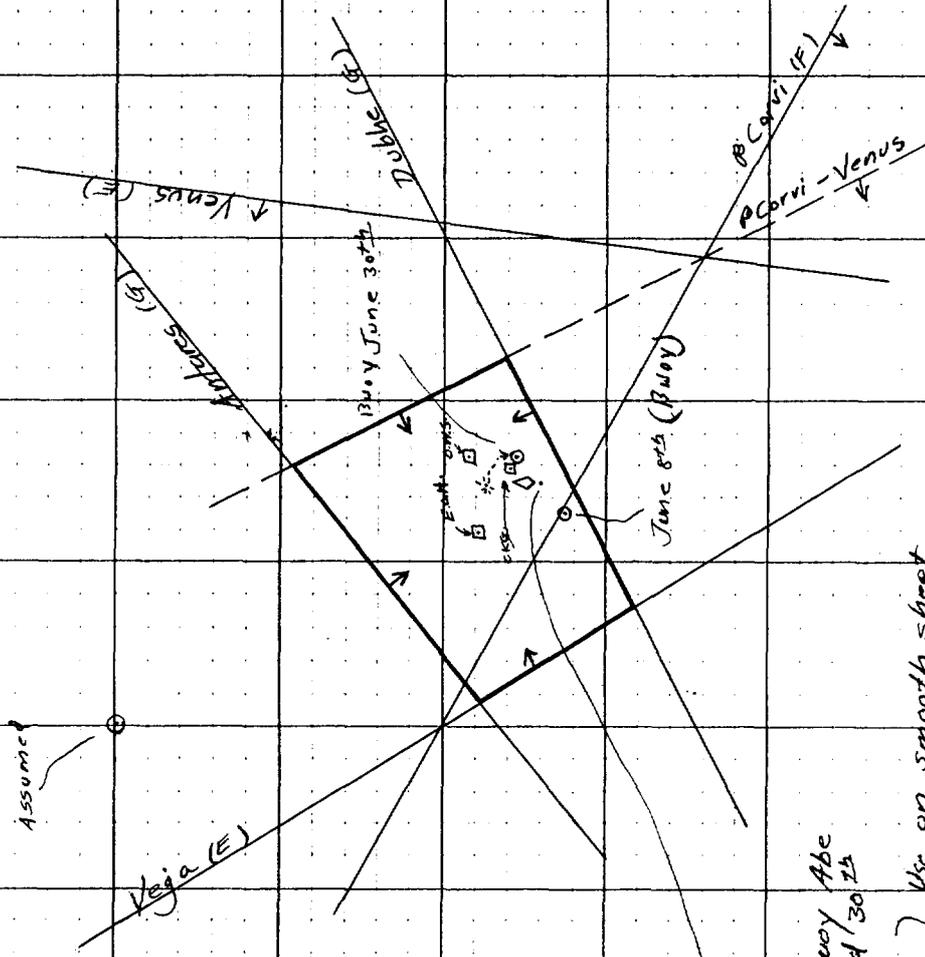
Assumed -  
Lat 25-25  
Long 169-38

V.A. to buoy = 1°-20'  
H.I. = 32 Ft.

Polaris bearing on buoy = 86 1/2°  
Ships head = 120° ps. L.

Buoy is 392 meters from  
ship. Azimuth 139 1/2°  
from North.

Location of buoy Abe  
Sheet 42  
(Raita Bank)



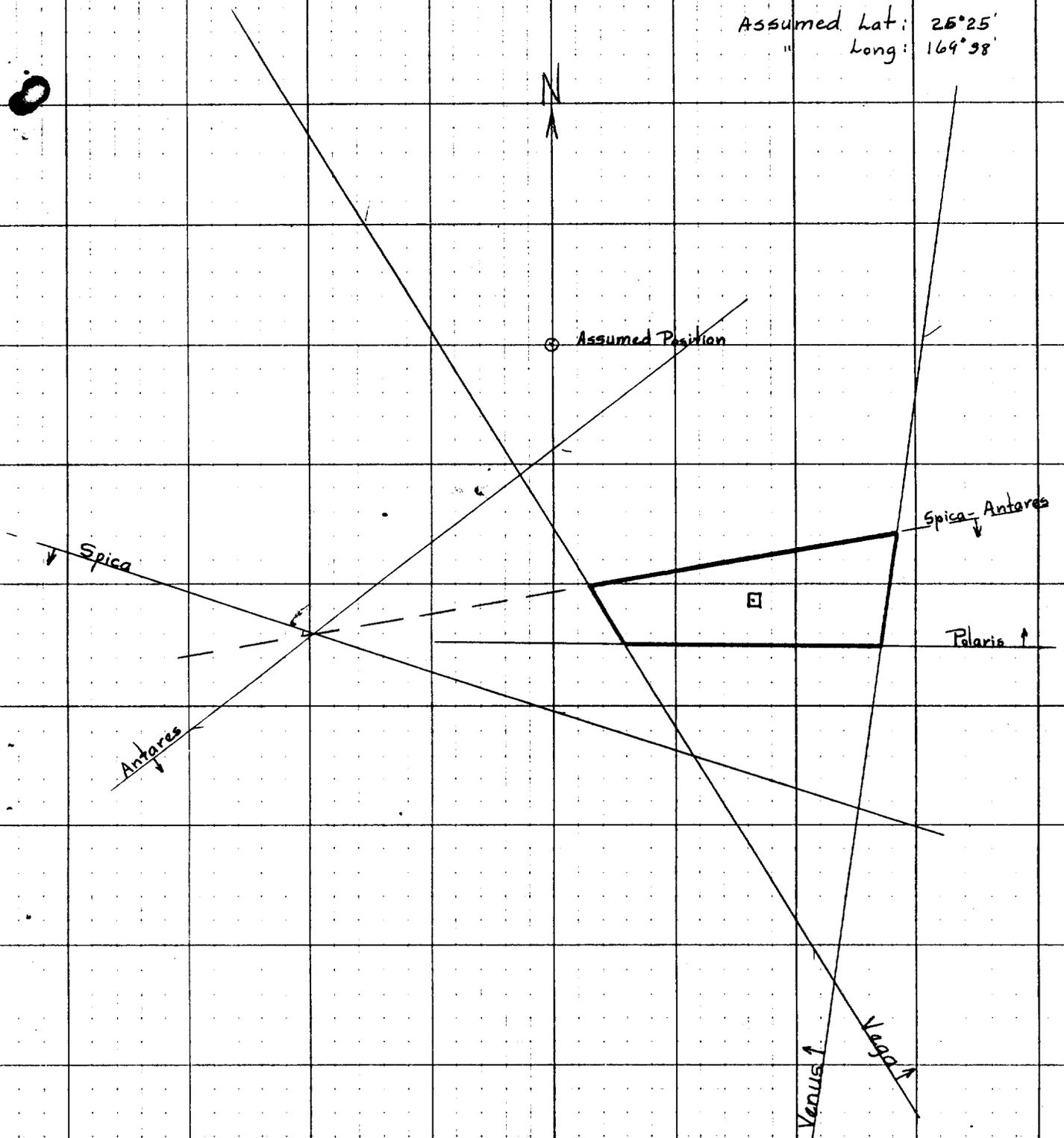
Mean position of buoy Abe  
for June 8th and 30th

Lat 25-22-24 } Use on smooth sheet  
Long 169-36-20 }

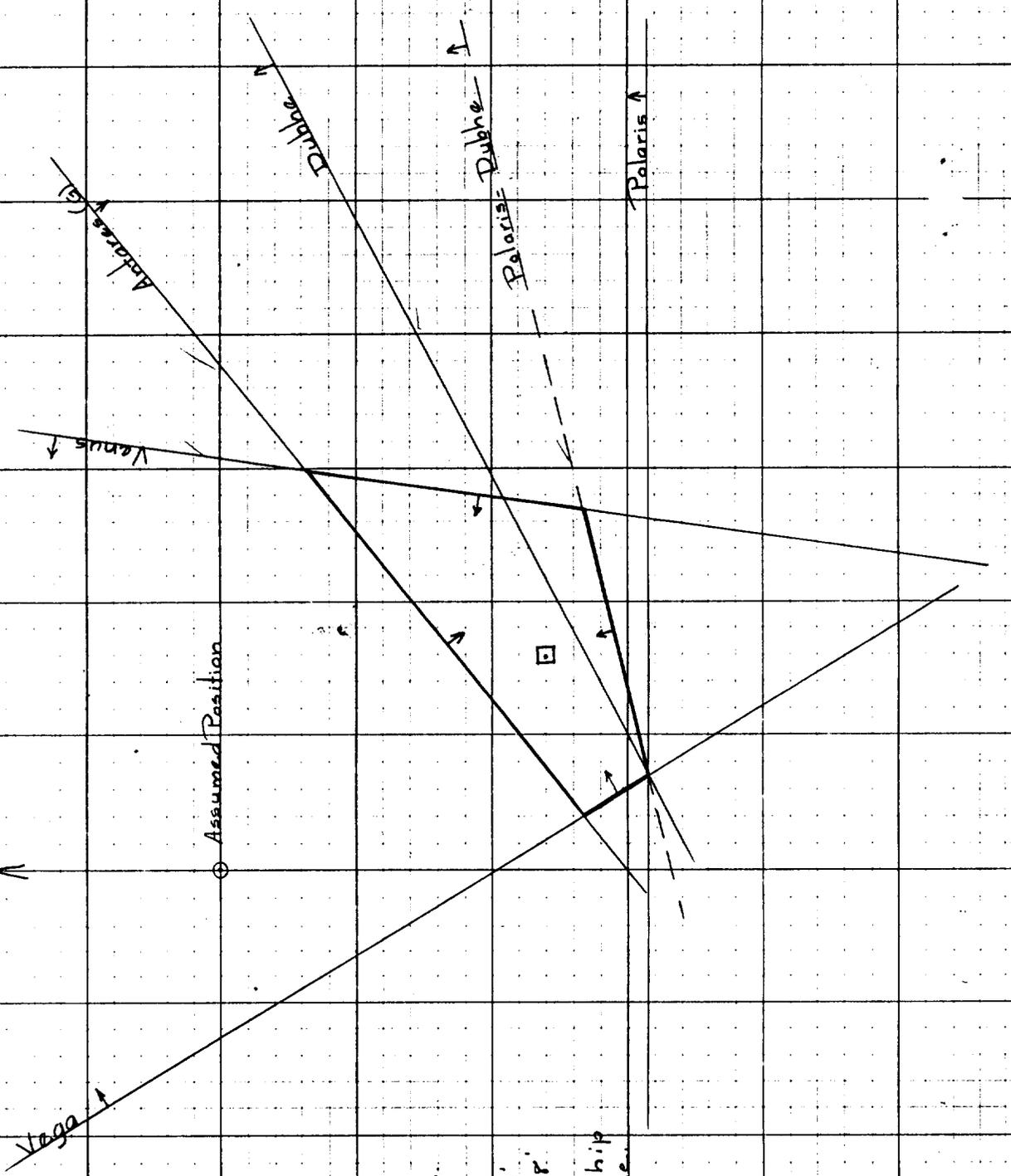
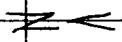
O.W.S.  
June 30, 1930

Position of Buoy "Abe"  
Raita Bank

Assumed Lat:  $25^{\circ}25'$   
" Long:  $169^{\circ}38'$



Sheet 42



C.K.G.  
June 30, 1930

Location of Buoy Abe.  
Raita Bank.

Assumed Lat.  $25^{\circ}25'$   
Long.  $169^{\circ}38'$

Buoy 392 is from ship  
Az.  $139\frac{1}{2}^{\circ}$  True.

E.O.H.  
June 8th 1930.

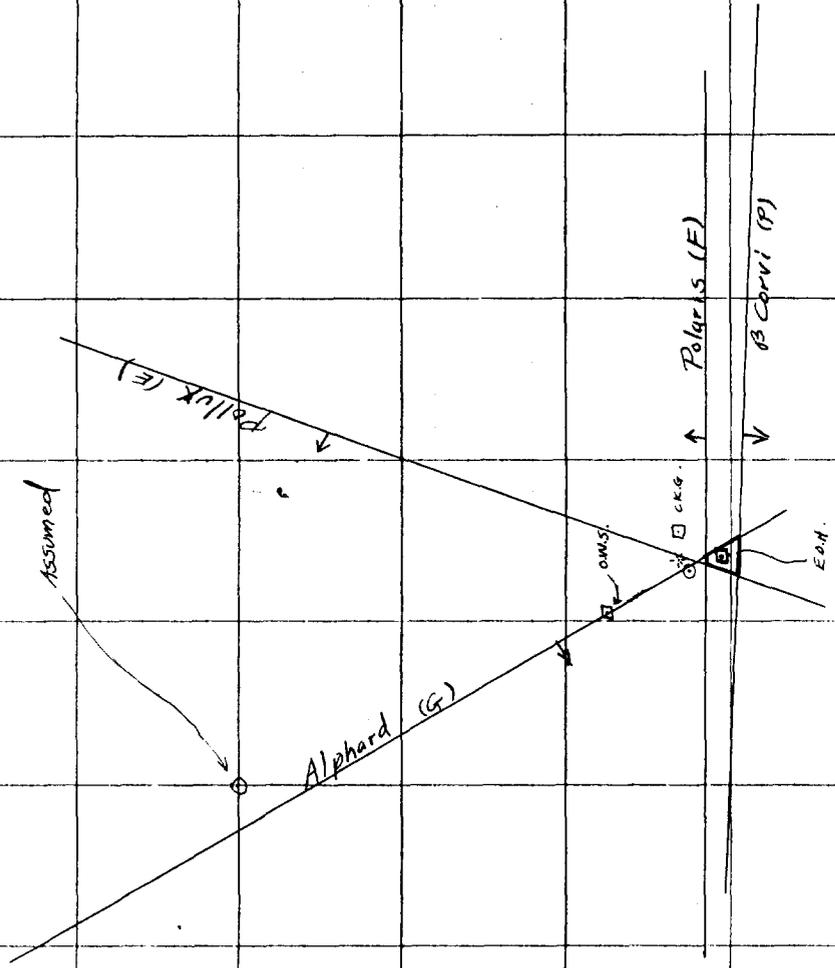
Location of buoy  
Abc. Sheet 42, Raita Bay

Assumed Lat. = 25-25  
Long = 169-38

V.A. to buoy = 3°-22' - 50"  
H.E. = 34 Ft.  
Bearing = 224° psc.

Buoy is 174 meters from  
ship in azimuth  
235° from North.

N

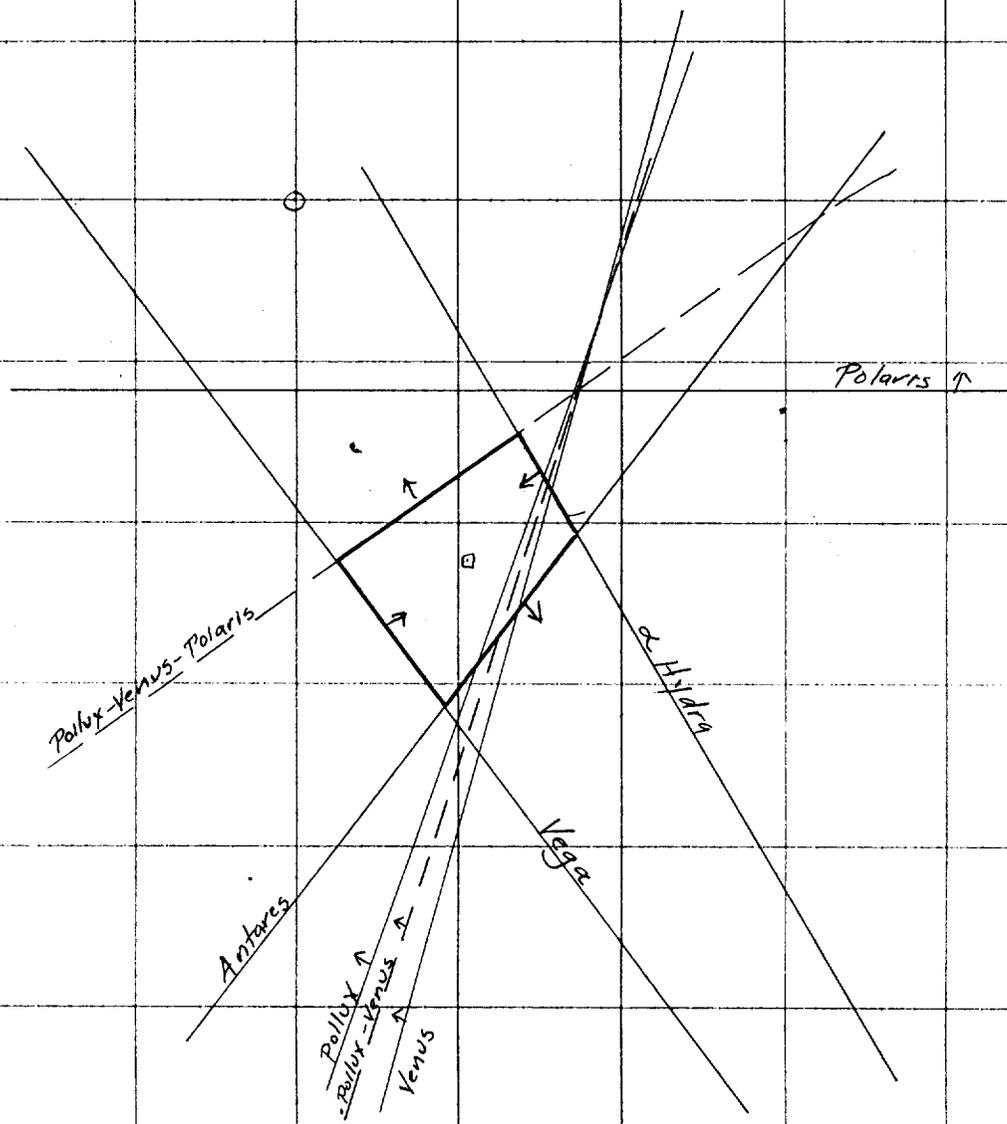


O.W.S.  
June 8<sup>th</sup> 1930.

Location of buoy  
"Abe" Sheet 4R

Assumed Lat = 25-25  
Long = 169-38

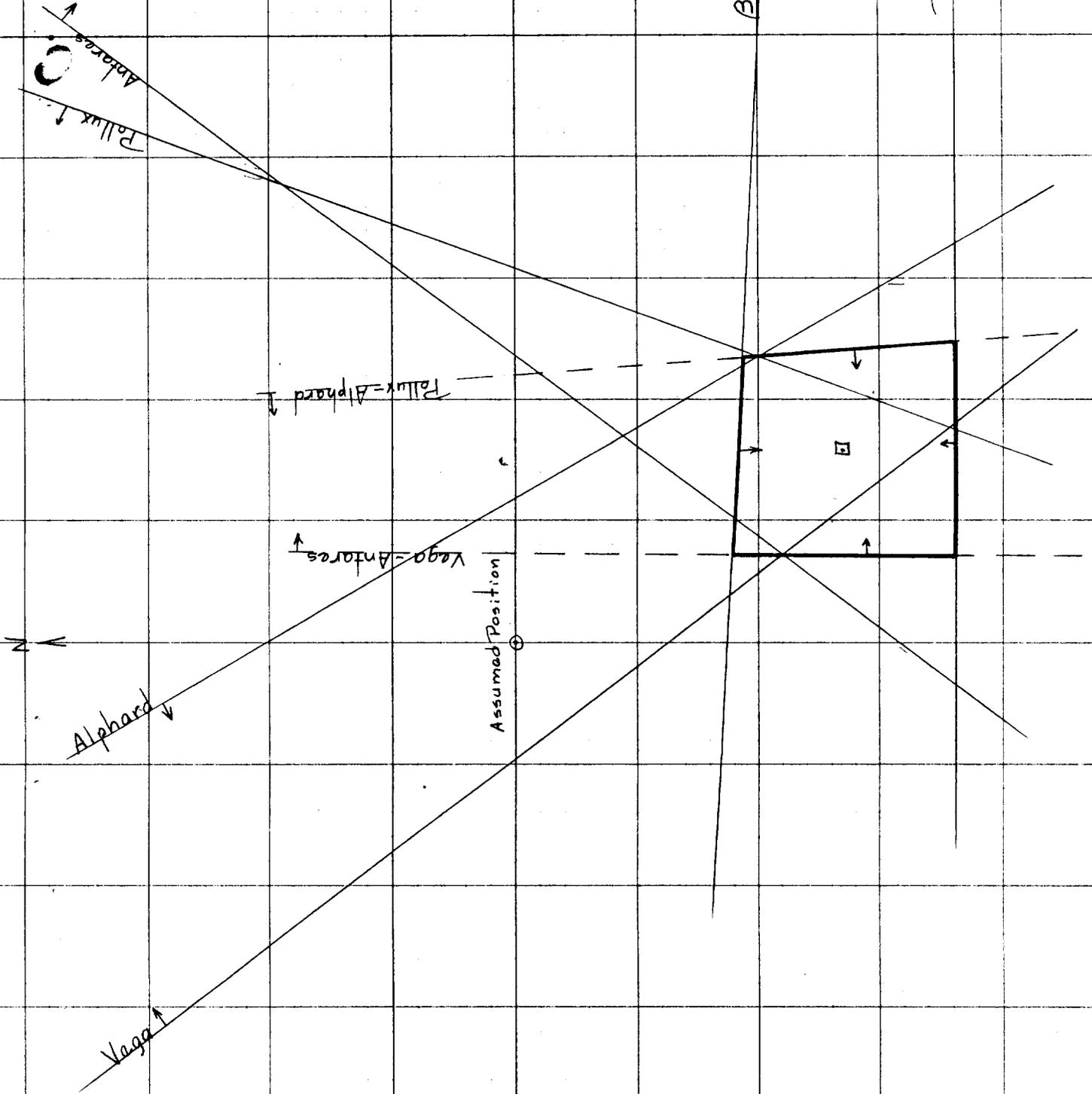
C



C.K.G.  
June 8, 1930

Location of Buoy "Abe"  
Maita Bank

Assumed:  
Lat:  $25^{\circ} 25'$   
Long  $169^{\circ} 38'$



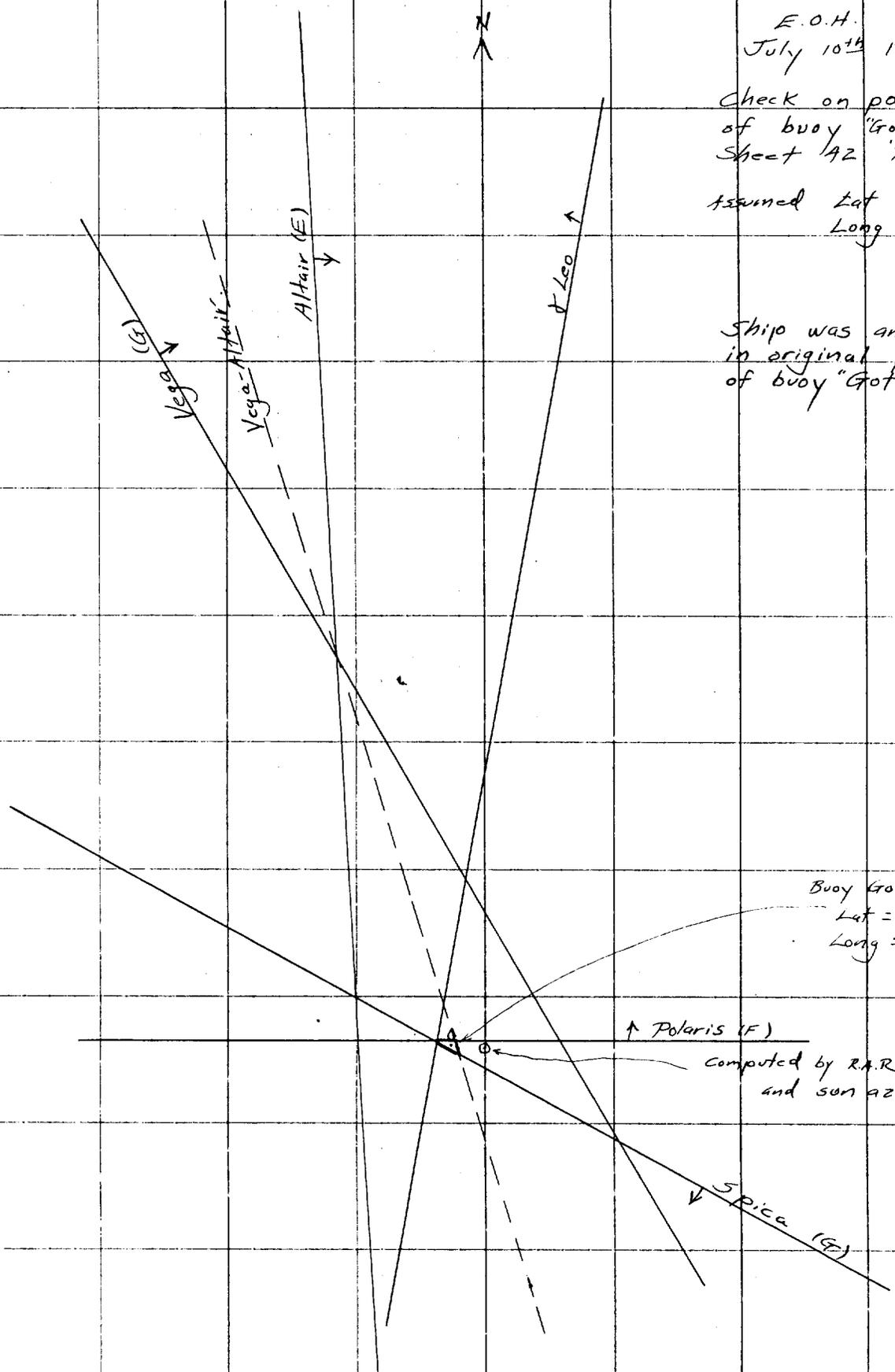
Assumed

E.O.H.  
July 10<sup>th</sup> 1930

Check on position  
of buoy "Got"  
Sheet 42 "Raita Bank".

Assumed Lat 25-47  
Long 169-25

Ship was anchored  
in original position  
of buoy "Got".



Buoy Got.  
Lat = 25-38.36  
Long = 169-24-12

Computed by R.A.R.  
and sun azimuths.

AT BOY

June 9th.	Sun to Abe Ø Sun right	V.A. @	H.I. 34 ft.
	79 15	10 30	
4 33 53			
<u>0 38 46</u>	10 30	88 47 00	9.99990
29 12 39	<u>+ 15 42</u>	22 57 30	9.96416
<u>+ 57</u>	AA 10 45 42	10 35 20	<u>0.00746</u>
29 13 38			9.97152
<u>11 18 28</u>	10 30		
17 55 08	<u>+ 5 20</u>	290 31 25	
t 5 55 08	10 35 20		
88 47 00			

Appr. &	Obs. Dist.	79 15		290 31 25	
	Appr. Alt.	<u>10 46</u>	0.00772	<u>79 03 10</u>	
		90 01		211 28 15	Az. Boy to Abe.
	S	<u>45 00</u>	9.84948		
	S - d	34 15	<u>9.91729</u>		
			19.77449		
			9.88724		

39 31 35  
79 03 10

AT BOY

June 9th.

	Sun to Abe / 0 m	V/A @	H.I.
	78 38	11 24	34 ft.
4 29 45			
<u>0 38 46</u>	11 24	87 45	9.99966
29 08 31	+ 15 42	d	9.96416
<u>+ 57</u>	11 39 42	11 29 45	<u>0.00880</u>
29 09 28			9.97262
<u>11 18 28</u>			
17 51 00	11 24	290 07 55	
	+ 5 45		
t 5 51 00	11 29 45		

Obs. Dist.

	78 38		290 07 55
	+ 15 42		78 39 18
	<u>78 53 42</u>		<u>211 28 37</u> Az. Boy to Abe.
	11 41	0.00907	
	90 34		
S	45 17	9.84736	
S - d	33 37	9.92052	
		<u>19.77696</u>	
		9.88848	

39 19 39  
78 39 18

BOY TO CAT

June 9, p.m.	Q to Cat.	V.A. Q	H.I.
	96 27	07 51	34 ft.
4 46 42			
<u>0 38 45.5</u>	07 51	91 59 15	9.99974
29 25 28	<u>+ 15 42</u>	22 57 36	9.96419
<u>+ 57</u>	08 06 42	07 54 46	<u>0.00416</u>
29 26 25			9.96809
<u>11 18 28</u>	07 51		
18 07 57	<u>3 46</u>	291 41 45	
t 6 07 57	07 54 46		
91 58 15			

Obs. Dist.	96 27		291 41 45
	<u>15 42</u>		<u>96 47 08</u>
Appr. Dist.	96 42 42		388 28 53
Appr. Alt.	<u>08 07</u>	0.00437	
	104 50		28 28 53 Az. Boy to Cat.
S	52 25	9.78528	
S-d	44 18	<u>9.85473</u>	
		19.64437	
		9.82218	

48 23 34  
96 47 08

BOY TO CAT

June 9, p.m.	Ø to Cat	V.A. 2	Boy & Cat	H.I.
	95 57	06 14	<del>00</del>	34 ft.
4 54 49	06 14	85 59 08		9.99893
<u>0 38 45.5</u>	<u>+ 15 42</u>	22 57 42		9.96419
29 33 34.5	06 29 42	06 16 15		<u>0.00261</u>
<u>+ 57</u>				9.96573
29 <del>34</del> 24.5	06 14			
<u>11 18 28.0</u>	<u>2 15</u>	292 27 48		
18 16 03.5	06 16 15			
t 5 43 56.5				
85 59 08				

Ap. Dist.	95 57	292 27 48	
	<u>06 30<sup>t</sup></u>	<u>+ 95 18</u>	
	102 27	388 27 06	
S	51 14	28 27 06	Az. Boy to Cat.
S - d	44 43		
	9.79668		
	<u>9.85162</u>		
	19.65110		
	9.82555		

47 59 39  
95 59 18

AT BOY

June 9.                      Sun to Abe                      V.A. ~~2~~                      H.I.  
     $\emptyset$  Sun right  
    79 10                      10 51                      31 ft.

4 32 25			
<u>0 38 46</u>	10 51	68 25 00	9.99983
29 11 11	+ 15 42	22 57 30	9.96416
<u>+ 57</u>	<u>11 06 42</u>	10 56 40	<u>0.00797</u>
29 12 08			9.97196
<u>11 18 28</u>	10 51		
17 53 40	+ 5 40	290 22 05	
	<u>10 56 40</u>		

t 5 53 40

88 25 00

Obs. Dist.	79 10		290 22 05	
App. Dist.	79 10		<u>78 57 24</u>	
App. Alt.	<u>11 07</u>	0.00824	211 24 41	Az, <sup>Boy</sup> <del>Abe</del> to <del>Boy</del> .
	90 17			
S	45 09	9.84834		
S - d	34 01	<u>9.91849</u>		
		19.77507		
		9.88754		

39 28 42  
 78 57 24

AMPLITUDE

Abe - Cat

Lat. 25 23  
Long. 169 37

Lat. 25<sup>o</sup> 24'      sec .04415  
      22 57.8      sin .59122  
                              .63537 sin True Amp.

True Amplitude

25<sup>o</sup> 35.2'

	25	35.2
	<u>270</u>	<u>00.0</u>
	295	35.2
+	<u>94</u>	<u>00.00</u>
	389	35.2
	<u>360</u>	
	29	35

Azimuth Abe to Cat 29<sup>o</sup> 35' (OWS)

ABE TO CAT

June 9, 1930

H.I. 31 ft.

	∅	V.A. @	
	94 55	01° 51'	
5 16 51		01 51	t 99 31 30 9.99397
<u>0 38 46</u>		+ 15 47	d 22 57 48 9.96414
29 55 37	AA	<u>02 06 47</u>	h 01 41 44 <u>0.00019</u>
+ 57			9.95830
<u>29 56 34</u>		01 51	
11 18 28		- 09 16	294 42 30
<u>18 38 06</u>	h	<u>01 41 44</u>	
t 6 38 06			

App. Dist.	94 55	
App. Alt.	<u>02 07</u>	0.00030
	97 02	
S	48 31	9.82112
S - d	46 24	<u>9.83861</u>
		19.66003
		9.83002

294 42 30
<u>94 55 06</u>
389 37 36

29 37 36 Az. Abe to Cat.

47 27 33

94 55 06



AT CAT

to Cat & Dog ~~to~~ V. A. to

	40	12		23	02	
5	44	10				
0	39	59		23	02	
18	24	09		<u>+</u>	<u>15</u>	<u>46</u>
-	3	11	AA	23	17	46
18	20	58				t 74 20 30 9.98358
11	18	20		23	02	a 23 15.1 9.96321
7	02	38		<u>+</u>	<u>8</u>	<u>35</u>
			h	23	10	35 0.03654
t	4	57				9.98333
						105 46 25
						74 13 35

Obs.	Ang.	Dist.	40	12		74	13	35
			<u>+</u>	<u>15</u>	<u>46</u>	<u>34</u>	<u>03</u>	<u>56</u>
Ap.	"	"	40	28		40	09	29
			<u>23</u>	<u>17</u>	0.03689			
			63	45				
	S		31	52	9.92905			
	S - D		8	36	9.99509			
					19.98103			
					9.98052			

Az. Cat to Dog.

17 01 58  
34 03 56

ABE TO CAT

June 9, 1930.

94 04      V.A. Q  
00 18

5 25 06	00 18	101 21 00	9.99145
0 38 46	15 42	22 57 48	9.96414
<u>30 03 52</u>	<u>00 23 42</u>		<u>0.00000</u>
11 18 28			9.95560
<u>18 45 24</u>			

295 28 08

t 6 45 24

Ap. Dist.	94 04		295 28 08
	+ 24	0.00001	94 04 02
	<u>94 28</u>		<u>389 32 10</u>

S 47 14      9.83188      29 32 10      Az. Abe to Cat.

S - d 46 50      9.83513  
19.66702

9.83351

47 02 01

94 04 02

AT CAT

0 to Cat & Dog ~~00~~

V. A. to 0

5 48 57	40 59	24 03	
<u>0 39 59</u>			
18 28 56			
<u>- 3 11</u>	24 03	t 106 51 15	9.98093
18 25 45	<u>+ 15 46</u>	d 23 15.1	9.96321
<u>11 18 20</u>	AA 24 18 46	h 24 11 41	<u>0.03993</u>
			9.98407
t 7 07 25	24 03		
	<u>+ 8 41</u>	105 25 26	
	h 24 11 41	74 34 34	

Obs. Dist.	40 59	74 34 34	
	<u>+ 15 46</u>	34 24 28	
Ap. Dist.	41 14 46	<u>40 10 06</u>	Az. Cat to Dog.
	<u>24 19</u>		
	65 34		0.04035
S	32 47		9.92465
S-d	8 28		<u>9.99524</u>
			19.96024
			9.98012
	17 12 14		
	34 24 28		

AT CAT

0 to Cat & Egg -00-

V. A.

5 53 03  
39 59  
 18 33 02  
 - 3 11  
18 29 51  
 11 18 20  
 t 7 11 31

42 32  
 24 58  
 + 15 46  
 AA 25 13 46  
 24 58  
 + 8 55  
 A 25 06 55

24 58  
 107 52 45 9.97850  
 d 23 15.1 9.96321  
 h 25 06 55 0.04313  
 9.98484  
 105 03 03  
 74 56 57

Obs. Dist. 42 32  
 + 15 46  
 App. Dist. 42 48  
25 14  
 68 02

74 56 57

35 47 36

39 09 21 Az. Cat to Egg.

.04355

S 34 01 9.91849

S-d 8 47 9.99488  
19.95692  
 9.97846

17 53 48

35 47 36

AT EGG

June 28, 1930.

$\Delta$  to C. & D. ~~00~~ V.A.  $\Delta$

	3 27 47		67 03		25 18	
	<u>0 39 58</u>					
	4 07 45		25 18			
	- 3 03		<u>15 45</u>	t	71 35 30	9.97719
	<u>28 04 42</u>	AA	25 33 45	d	23 16.9	9.96311
	<u>11 18 20</u>			h	25 26 46	<u>0.04432</u>
	16 46 22		25 18			9.98462
			<u>+ 8 46</u>			
t	4 46 22	h	25 26 46		285 09 30	

Obs. Dist.	67 03		285 09 30	
	<u>+ 15 45</u>		<u>64 41 42</u>	Az. Dog. to Cat.
	67 19		220 28 32	
	<u>25 34</u>	0.04475		
	92 53			
S	46 26	9.83834		
S-d	20 53	<u>9.97049</u>		
		19.85358		
		9.92679		
	32 20 31			
	64 41 02			

AT EGG

June 28, 1930

Lat. 25 30  
Long. 169 35

	O to Egg	V.A.	Dog & Egg <del>00</del>	H.I.
	68 37	26 06		29 ft.
3 24 16	26 06		t 70 42 45	9.97491
0 39 58	+ 15 45		d 23 16.9	9.96311
28 04 14	AA 26 21 45		h 26 14 55	<u>0.04727</u>
- 3 03				9.98529
28 01 11	26 06			
11 18 20	+ 8 55		284 49 43	
16 42 51	26 14 55			
t 4 42 51				

Obs. Dist.	68 37	284 49 43	
	+ 15 45	<u>66 18 00</u>	
	68 52 45	218 31 43	Az. Egg to Dog.
	<u>26 21</u>		
	95 15		0.04771
S	47 38		9.82858
S - d	21 15		<u>9.96942</u>
			19.84571
			9.92285

33 09 00

66 18 00

Note :

Do not use - Apparently in error

Lat. 25 25  
 Long. 169 35

AT DOG

∅ to Dog & Egg ~~00~~  
 37 12

V.A. @  
 17 17

H.I.  
 29 ft.

5 17 08					
<u>0 39 59</u>		17 17		t 81 05 45	9.99473
17 57 08		+ 15 46		d 23 15.1	9.96321
- 3 11	AA	<u>17 32 46</u>		h 17 24 49	<u>0.02037</u>
17 53 57					9.97831
<u>11 18 20</u>		17 17			
t 6 35 37		+ 7 49		107 57 28	
5 24 23	h	<u>17 24 49</u>			
				72 02 32	

Obs. Dist.	37 12		72 02 32	
	+ 15 46		<u>33 38 26</u>	
Ap. Dist.	37 27 46		38 24 06	Az. Dog. to Egg.
	<u>17 33</u>	0.02070		
	55 00			
S	27 30	9.94793		
S - d	9 58	<u>9.99339</u>		
		19.96202		
		9.98101		

16 49 13

33 38 26

June 29, 1930.

AT DOG

H.I. 29 ft.

Δ to Dog & Egg ~~00~~

V.A. Q

37 37

17 47

5	19	33
0	39	59
17	59	32
	3	11
17	56	21
11	18	20

	17	47
	+	15 46
AA	18	02 46
	17	47
	+	7 38
h	17	54 38

t	99	30	15	9.99400
d	23	15.1		9.96321
h	17	54	38	<u>0.02157</u>
				9.97878
	107	45	56	
	72	14	04	

t 6 38 01

Obs. Dist.

37	37
+	15 46

Ap. Dist.

37	53
18	03
55	56

0.02192

72 14 04

33 53 34

38 20 30 Az. Dog to Egg.

S	27	58	9.94607
S - d	9	55	<u>9.99346</u>
			19.96145

9.98072

16 56 47

33 53 34

AT EGG

July 3, 1930, pm

lat. 25 40  
long. 169 35

O to Cat  
69 53

V. A. (FB(  
15 12

H.I.  
33 ft.

4 15 04  
0 40 21  
28 55 25  
- 04 02  
28 51 23  
11 18 20  
17 33 03  
t 5 33 03  
83 15 45

15 12  
+ 15 45  
AA 15 27 45  
  
15 12  
+ 6 59  
h 15 18 59

83 15 45 9.99699  
22 57.2 9.96418  
15 18 59 0.01571  
9.97768  
  
288 31 48

Dist. 69 53  
+ 15 45  
Ap. Dist. 70 08 45  
15 27 45  
85 26 30  
S 42 43  
S - d 27 26

0.01601  
9.86612  
9.94819  
19.83032  
9.91516

288 31 48  
69 19 08  
219 12 40 Az. Egg to Cat.

34 39 34  
69 19 08

AT EGG

July 3rd, a.m.	Ø to Fin	V.A. a	H.I. 33 ft.
	35 21	09 28	
4 41 04			
<u>0 40 19</u>	09 28	89 46 30	0.00000
17 21 23	+ 15 46	22 59.5	9.96405
- 3 57	<u>09 43 46</u>	‡ 09 32 40	<u>0.00605</u>
17 17 26			9.97010
<u>11 18 20</u>	09 28		
t 5 59 06	+ 4 40	111 01 04	
	h 09 32 40	68 58 56	
89 46 30			

Øbs. Dist.	35 21		68 58 56
	+ 15 46		<u>34 25 32</u>
Ap. Dist.	<u>35 36 46</u>		34 33 24 Az. Egg to Fin.
	09 44	0.00630	
	<u>45 21</u>		
S	22 40	9.96509	
S-d	12 57	<u>9.98881</u>	
		19.96020	
		9.98010	

17 12 46  
34 25 32

AT EGG

Lat. 25 40  
Long. 169 35

July 3, a.m.

0 to Fin

V.A. Q

H.I.

34 26

08 16

33 ft.

4 35 11			
<u>0 40 19</u>	08 16	88 17 30	9.99981
17 15 30	+ 15 45	22 59.5	9.96405
- 3 57	AA 08 31 45	h 08 20 09	0.00461
<u>17 11 33</u>			<u>9.96847</u>
11 18 20	08 16		
t <u>5 53 10</u>	+ 4 09	111 34 10	
	h 08 20 09	68 25 50	
88 17 30			

Obs. Dist.	34 26		68 25 50	
Apprv-Dist.	+ 15 45		33 43 46	
Appr. Dist.	<u>34 41 45</u>		<u>34 42 04</u>	Az. Egg to Fin.
Appr. Alt.	08 32	0.00484		
	<u>42 74</u>			
S	21 37	9.96832		
S-d	13 05	<u>9.98858</u>		
		19.96174		
		9.98087		

16 51 53  
33 43 46

AT EGG.

July 3rd, a.m.      O to Got      V.A. a      Egg & Got ~~00~~  
                                  34 40      08 52      (FB)

	4 37 44				
	<u>0 40 19</u>				
	17 18 03		08 52	88 56 30	9.99993
	<u>7- 3 57</u>		+ 15 45	22 59.5	9.96405
	17 14 06	AA	09 07 45	08 56 33	<u>0;00531</u>
	<u>11 18 20</u>		08 52	111 17 38	9.96929
t	5 55 46		+ 4 33	68 42 22	
		h	08 56 33		
	88 56 30				

Obs. Dist.	34 40		68 42 22	
	+ 15 45		<u>33 52 00</u>	
	<u>34 55 45</u>		34 50 22	Az. Egg to Got.
	09 08	'		
	<u>44 04</u>			
S	22 02			0.00554
S - d	12 54			9.96706
				<u>9.98890</u>
				19.96510
				9.98075
	16 56 00			
	33 52 00			

AT EGG.

July 3, 1930 a.m.	to Got	V.A. a	Egg & Got <del>00</del>
	34 56	09 11	
4 39 35	09 11		
0 40 19	+ 15 45	t 89 24 15	9.99998
17 19 54	AA 09 26 45	d 22 59.5	9.96405
- 3 57		h 09 15 44	<u>9.00570</u>
17 18 57	09 11		9.96973
11 18 20	+ 4 44		
t 5 57 87	h 09 15 44	111 08 39	
		68 51 21	
89 24 15			

Obs. Dist.	34 56		
	+ 15 45		
Appr. Dist.	35 11 45	68 51 21	
	09 27	<u>34 03 56</u>	
	44 39	34 47 25	Az. Egg to Got.
S	22 19		
S - d	12 53		
		0.00593	
		9.96619	
		<u>9.98893</u>	
		19.96105	
		9.98052	

17 01 58  
34 03 56

POSITION COMPUTATION, THIRD-ORDER TRIANGULATION

α		to 3		to 2		to 1		to 3	
2 <sup>d</sup> L	2	209	35	180	00	00.0	180	00	00.0
Δα	2								
α'	1								
738.5 m.		FIRST ANGLE OF TRIANGLE		539.2 m.		118.3 "		118.3 "	
11078 "									
φ	25	22	20	25	27	35.6	3	25	27
Δφ	+	05	14.6	-	03	9.7		+	01
φ'	25	27	20.3	25	24	25.9	1	25	24
Logarithms		Values in seconds		Logarithms		Values in seconds		Logarithms	
s	4.024612	{ 187.8 658.5		s	3.822233	{ 879.3 957.0		s	3.822233
Cos α	9.934239	S = 1133 "		Cos α	9.944036	S = 6641 "		Cos α	9.944036
B	8511866	1st term - 314.64		B	8511861	1st term + 189.23		B	8511861
h	2492877	Sin α'		h	2278130	Sin α'		h	2278130
s <sup>2</sup>	1093224	A'		s <sup>2</sup>	7644466	A'		s <sup>2</sup>	7644466
Sin <sup>2</sup> α	9.386906	Sec φ'		Sin <sup>2</sup> α	9.356394	Sec φ'		Sin <sup>2</sup> α	9.356394
C	108189	Δλ		C	10836	Δλ		C	10836
h <sup>2</sup>	494563	Sin 1/2(φ+φ')		h <sup>2</sup>	5.0846	Sin 1/2(φ+φ')		h <sup>2</sup>	5.0846
D	22806	-Δα		D		-Δα		D	
3d term + 1.002		3d term + 189.74		3d term +		3d term +		3d term +	
-Δφ - 314.06		-Δφ - 314.06		-Δφ -		-Δφ -		-Δφ -	
1/2(φ+φ')		Logarithms		1/2(φ+φ')		Logarithms		1/2(φ+φ')	
Values in seconds		Values in seconds		Values in seconds		Values in seconds		Values in seconds	
92.2		1584.1		1584.1		95.0		1581.9	

Compd O.W.S.  
✓ V.C.E.





February 14, 1933.

Division of Hydrography and Topography:

✓ Division of Charts:

Tide Reducers are approved in  
7 volumes of sounding records for

HYDROGRAPHIC SHEET 5207

Locality Raita Bank, Hawaiian Islands

Chief of Party: O. W. Swainson in 1930

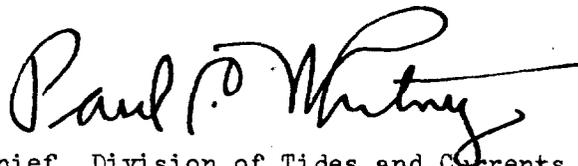
Plane of reference is mean lower low water reading

3.5 ft. on tide staff at Honolulu

17.3 ft. below B. M. 2

Time allowance +1 hour, range  $\frac{1}{2}$  as large at place of sounding  
Height of mean higher high water above plane of reference 1-foot.  
Condition of records satisfactory except as checked below:

1. Locality and sublocality of survey omitted.
2. Month and day of month omitted.
3. Time meridian not given at beginning of day's work.
4. Time (whether A.M. or P.M.) not given at beginning of day's work.
5. Soundings (whether in feet or fathoms) not clearly shown in record.
6. Leadline correction entered in wrong column.
7. Field reductions entered in "Office" column.
8. Location of tide gauge not given at beginning of day's work.
9. Leadline corrections not clearly stated.
10. Kind of sounding tube used not stated.
11. Sounding tube No. entered in column of "Soundings" instead of "Remarks".
12. Legibility of record could be improved.
13. Remarks.



Chief, Division of Tides and Currents.

Field Records Section (Charts)

HYDROGRAPHIC SHEET No. *5207 (Conf)*

The following statistics will be submitted with the  
cartographer's report on the sheet:

Number of positions on sheet	<i>1808.</i>
Number of positions checked	<i>419.</i>
Number of positions revised	<i>8.</i>
Number of soundings recorded	<i>12,330</i>
Number of soundings revised	<i>56</i>
Number of signals erroneously plotted or transferred	<i>✓</i>

Date: *March 22, 1933*.....

Cartographer: *Harold W. Murray*.....

Applied to Comp of Chart 4182 8/5/40 CRBSr